INSTRUCTION MANUAL

# Smart Positive Displacement (SPD) Vacuum Pump

Models:

*SPDS-3/15-46-24; SPDS-5/20-46-24;*
*SPDS-7.5/22-46-24; SPDM-7.5/20-46-24*


Document: “SPD 3-7.5HP IM 31 OCTOBER 2024”

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Please record the following information, which is specific to this piece of equipment, in the space provide.

In the event of aftermarket assistance, our Parts/Service Department will need this information, along with the manual revision date, to properly respond & assist to any of your requests for the specific equipment installed.

Please keep this instruction manual, any relevant addendums, engineering prints, and parts lists together for accurate documentation of your equipment.

Instruction Manual: SPD 3-7.5HP IM 31 OCTOBER 2024

Model #:_____

Serial #:_____

NOTES:

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## *1.) INTRODUCTION*

The Novatec SPD vacuum pump is designed to be the next step in vacuum conveying. Traditional vacuum pump technologies, such as positive displacement (PD) & regenerative blowers (RB), are used to pneumatically convey plastic pellets or powders in a conveying system; creating a vacuum to "pull" air through the piping system. Plastic pellets or powders are introduced into the moving air stream in various ways, including the use of probes, pick-up tubes, and rotary airlocks. The SPD is used in conjunction with vacuum chambers, station valves, etc. to form the conveying system; of which is controlled with either Master Control or Distributed Control Panels. Several vacuum pump units may be designed into the system as required. Vacuum conveying systems typically distribute material from silos, surge bins, blenders, or drying hoppers to processing machinery.

The Novatec SPD vacuum series is a direct-drive (no belts) positive displacement vacuum unit with an incorporated blower/motor sound enclosure. The series provides a number of additional features & increased performance capability over traditional positive displacement vacuum units that improves system operation, monitoring & maintenance.

All Novatec PD vacuum pumps include:

- A **motor & blower combination** to meet performance needs per designed application.
- A **combination vacuum breaker & relief valve** that functions with a controller "idle/standby" mode & prevents operation under excessive vacuum by limiting achievable levels per designed standards. Both functions extend pump component life, see section 7.2 for more information.
- A **vacuum inlet safety filter assembly** with 2-micron efficiency for blower protection & clear-view housing for filter status clarity.
- An onboard power & control wiring junction box that houses:
    - A **disconnect switch** providing local operation for safety & easy of pump operation status changes between enabled/disabled.
    - A **circuit breaker** providing local over amperage protection.
    - A **motor starter & electronic overload** to start/stop the motor of the pump
    - Consolidated **controls wiring terminal blocks** labeled for ease of terminating signal wiring from central control.

Uniquely, each standalone SPD pump is equipped with:

- A **highly efficient motor** based on EV drive technology (an Internal Permanent Magnet Synchronous Reluctance Motor, aka "IPMSynRM", with IE4-IE5 efficiency well above today's IE3 standard) providing wide operational range & instantaneous torque,
- A **variable frequency drive** (VFD) required for motor operation in lieu of motor starter & electronic overload, adding RPM adjustment (manual or signal controlled),
- An **electronic air regulator** for adjustable vacuum relief points (with Novatec's standard combination vacuum breaker & relief valve, manual or signal controlled), and
- Local **Novatec PumpSense** for unit status/health monitoring, including on-pump status indicator LEDs to quickly notify users of oil & filter status. Trending & local data management with Master DataHub, see section 9 for details.
- Several **sound abatement** features & components to reduce overall operational noise generation compared to unabated industry standard units.

More capabilities become unlocked when paired with Novatec's FlexXpand Gen 3 (FX3) Central Conveying Control System:

- **Automatic RPM** adjustments based on one of four speed selections per loading station (Rabbit, Target, Turtle, Reducer) to accommodate different conveying distances, additive line sizes, materials, and velocities.
- **Automatic Vacuum Relief Point** adjustments based on plant elevation (barometric sensor & manual input) to protect pump blower while providing optimal performance, and to provide additional pulling power when the system requires it.
- **Automatic Conveying "Boost"** operation increasing RPM & vacuum relief point momentarily to overcome excessive line slugging and reduce chances of plugging.
- **Energy Saver Mode** while in vacuum idle allowing the pump to reduce RPMs in no demand situations to operate at minimal amperage.
- Central **Novatec PumpSense** for unit & system status/health monitoring on controller HMI/screen with Master DataHub, including full pump status (oil, filter, bearings, etc), operational trending & real-time readouts of vacuum levels, utilization & potential excess pump capability, and more!

Two configurations are available to handle different performance needs: standard positive displacement (SPD**S**) & MaxFlo positive displacement (SPD**M**). The SPDS provides standard CFM capability at nominal max vacuum levels of 11-13inHg for short to moderate conveying systems. The SPDM provides higher CFM capability at nominal max vacuum levels of 14-15inHg for moderate to long distance conveying systems. Both include a number of sound reduction features (such as vibration pads, insulated motor & blower enclosure, etc) to provide significantly quieter operation than the industry standard!

## *2.) SERVICE & OPERATION WARNING*

**ALWAYS DISCONNECT POWER BEFORE SERVICING**. Only qualified technicians should service, maintain, or repair the vacuum conveyor pump. Before using this equipment, read in detail the product bulletins and other information found in this manual. A safe installation is necessary before operating the equipment. The instructions should be understood and followed before installing or operating the equipment.

## *3.) OPERATING LIMITATIONS*

### *3.1) Operating at Higher Altitudes…3000FT Above Sea Level or More*

Atmospheric pressure is lower at higher elevations; and, as a result, the compression of air by the pump requires more work for vacuum/pressure conveying. Blower exhaust temperature and motor cooling are functions of pressure level and elevation. Vacuum Blower exhaust temperature should be regulated with respect to material being conveyed, and can sometimes require the use of an intake air cooling coil. In other cases, increased motor Full Load Amperage (FLA) limits may require increased motor horsepower (HP). In these higher altitude applications, the vacuum relief valve of the SPD will need to be adjusted to the appropriate level to prevent the pump from damaging itself or the motor by attempting to compress air of reduced density to an inadequate operational level. In most cases, this process should be automated when utilizing Novatec PumpSense and/or conveying controller FlexXpand Gen 3 (FX3).

*Failure to adjust the pump performance for elevated locations will void the unit warranty when not used with Novatec PumpSense and/or conveying controller FlexXpand Gen 3 (FX3). When the end-use site is known, Novatec endeavors to pre-adjust the pump's performance at the factory to compensate for elevations above 3000 feet. Novatec then labels the vacuum relief valve accordingly. If your pump-use site is 3000 feet above sea level or more, and no indication of pre-adjustment is present on the blower assembly, please contact your Novatec Sales Rep or the Novatec Service Department at the number on the*

*front cover of this manual to get aid/instructions for adjusting your SPD pump for use at elevations at 3000 feet or more above sea level.*

### *3.2) Seek Time*

Excessive starting and stopping of the pump will reduce blower and motor life and void the warranty. Seek Time is a control parameter that allows your pump to operate for short periods in vacuum break mode (no vacuum loading) while the system control searches for new demands. Using the Seek Time feature, pump starts must be limited to 12 per hour to prevent premature failure. The minimum Seek Time for a pump is 240 seconds to prevent exceeding 12 starts per hour & provide adequate blower cooling in the no load condition. Optimum Seek Time may be set dependent upon pump capacity, utilization, number of stations, capacity of each vacuum chamber, and individual station throughputs. (See your control panel instruction manual for information on Seek Time)

## *4.) UNPACKAGING*

Caution should be exercised when handling the equipment. The vacuum pump unit (SPD) is usually shipped completely assembled and requires no further attention prior to installation. Unit is skidded and housed within a cardboard enclosure. Inspect packaging for any damage that may be concerning to the received product. Note any shipping damage on delivery receipt and report immediately to trucking company.

## *5.) GENERAL INSPECTION*

When the unit is unpacked, make a visual inspection looking for missing parts or damage that may have occurred during shipment. Report any missing parts to Novatec, Inc. immediately. All electrical & mechanical connections should be checked for tightness, as vibration during transit may cause them to loosen. Inside the control box is a Quality Control (QC) sheet, a set of electrical & assembly drawings, along with this manual for reference. These documents should be kept on file and be readily available for any operational or maintenance information.

**IMPORTANT:** Before placing the SPD unit into service, be sure oil has been put in the individual blowers at the proper levels. Oil is normally shipped in the blower; however, oil may have been drained following factory quality control testing. See Section 13 for lubrication guidelines.

*Replacement blowers are shipped without oil installed.*

# 6.) ENGINEERING DATA & SPECIFICATIONS

## 6.1) Application Drawings & Information:

| Assembly Model | SPDS-3/15-XX-24 | SPDS-5/20-XX-24 | SPDS-7.5/22-XX-24 | SPDM-7.5/20-XX-24 |
|---|---|---|---|---|
| Electrical Print | CNTL-SPD-3-XX-XX | CTNL-SPD-5-XX-XX | CTNL-SPD-7.5-XX-XX | |

## 6.2) Specifications:

| Nom. Horsepower (HP) | 3HP | 5HP | 7.5HP | 7.5HP |
|---|---|---|---|---|
| Flow Rate (CFM) | 55ACFM | 100ACFM | 135/155ACFM | 115ACFM |
| Line Size | 1.5" OD | 2.0" OD | 2.25"/2.5" OD | 2.0" OD |
| Nom. RPM | See *SPDS-3/15* Dwg | See *SPDS-5/20* Dwg | See *SPDS-7.5/22* Dwg | See *SPDM-7.5/20* Dwg |
| Operational Vacuum | -10.5" Hg | -11.5" Hg | -11.5" Hg | -13" Hg |
| Vacuum Relief | -11.5" Hg | -12.5" Hg | -12.5" Hg | -14" Hg |

**NOTE:** For dimensional information, please see the associated assembly drawings.

## 6.3) Utilities (460V):

| Electrical | 460V/3Ph/60Hz | | |
|---|---|---|---|
| Control Print | CNTL-SPD-3-46-24 | CNTL-SPD-5-46-24 | CNTL-SPD-7.5-46-24 |
| Total Connected Amperage (VFD) | 6.2A | 9.8A | 17.6A |
| Total kVA | 4.9kVA | 7.8kVA | 11.1kVA |
| Supplied Circuit Breaker (VFD*) | 15A | 20A | 25A |
| Compressed Air | 80-100psig | | |

**NOTE:** Standard control voltage: 24VDC. *Circuit breaker protection sized for full VFD drive capability, not based on motor FLA, and is not indicative of actual power usage*

## 6.4) Alternate Utilities (400V)

| Electrical | 400V/3Ph/50Hz | | |
|---|---|---|---|
| Control Print | CNTL-SPD-3-46-24 | CNTL-SPD-5-46-24 | CNTL-SPD-7.5-46-24 |
| Total Connected Amperage (VFD) | 10.1A | 12.9A | 16.5A |
| Total kVA | 7.0kVA | 7.7kVA | 11.4kVA |
| Supplied Circuit Breaker (VFD*) | 15A | 20A | 25A |
| Compressed Air | 80-100psig | | |

**NOTE:** Standard control voltage: 24VDC. *Circuit breaker protection sized for full VFD drive capability, not based on motor FLA, and is not indicative of actual power usage*

## 6.5) Alternate Utilities (575V)

| Electrical | 575V/3Ph/60Hz | | |
|---|---|---|---|
| Control Print | CNTL-SPD-3-57-24 | CNTL-SPD-5-57-24 | CNTL-SPD-7.5-57-24 |
| Total Connected Amperage (Nom.) | TBD | TBD | TBD |
| Total kVA | TBD | TBD | TBD |
| Supplied Fuse Block (VFD*) | TBD | TBD | TBD |
| Compressed Air | 80-100psig | | |

**NOTE:** Standard control voltage: 24VDC. *Fused protection sized for full VFD drive capability, not based on motor FLA, and is not indicative of actual power usage.

# 7.) MECHANICAL INSTALLATION

## 7.1) General Installation:

Only qualified technicians familiar with local and national codes should install this equipment. Vacuum lines should be installed as shown on the installation drawings. Clean compressed air (80 - 100psig) to be supplied to the air actuated valves as required (A filter, if not supplied, should be installed if the cleanliness of the air is questionable). See notes on electrical installation for the 3-phase power connection and for installation of a nearby 3- phase disconnect switch to allow easy disconnection of power to the pump for service or in the case of an emergency.

Locate the pump where it can be interconnected with the vacuum system piping easily. Place the unit on a level/flat base with the inlet and outlet ducts conveniently positioned for conveying.

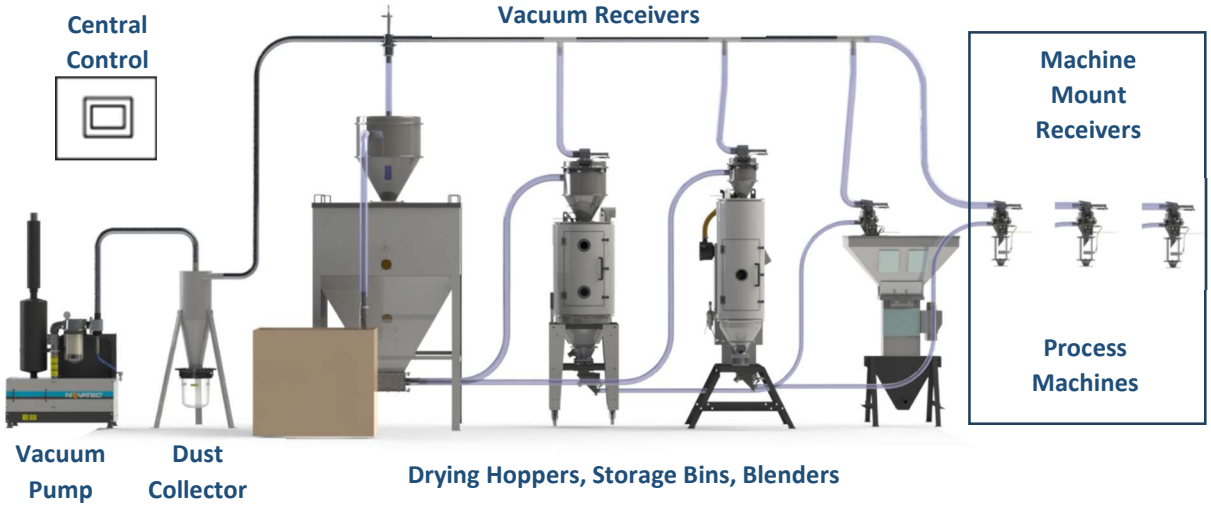



*Figure 1: General System Layout*

Accommodations should be made to allow full access of the pump for service, especially the starter, filter, vacuum breaker valve, vacuum blower and vacuum relief valve. The vacuum gauge should be visible but can be carefully rotated in its fitting as required. The pump should be secured to the floor to prevent movement from vibration; by hard mounting the supplied vibration isolating pads that are used to minimize noise transfer to the floor.

The pump is commonly located near the vacuum conveying system's cyclone or filtered dust collector and is commonly connected directly to the collector lid with rigid tubing or flex hose. It is convenient to service the dust collector and the pump filter at the same time.

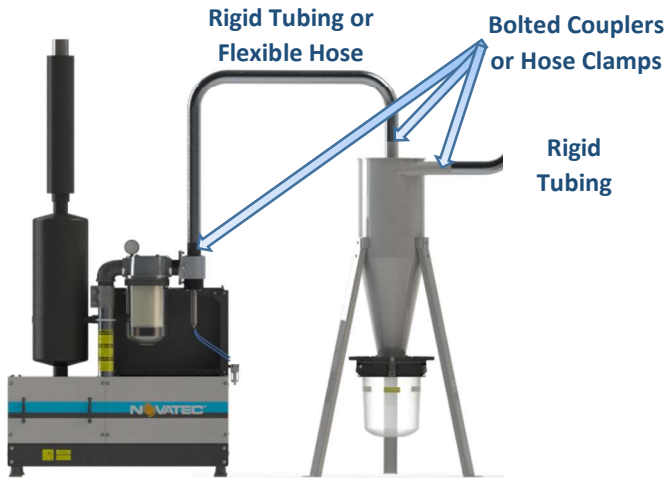



*Figure 2: General Pump & Dust Collection Filter Connection*

### *7.2) Combination Vacuum Breaker & Relief Valve*

The Novatec vacuum breaker valve for system seek operation also serves as the vacuum relief valve to regulate the pump's workload. The dual functionality is accomplished by utilizing an equilibrium of compressed air pressure and vacuum level in conjunction with the vacuum breaker action, governed by the system's control panel.

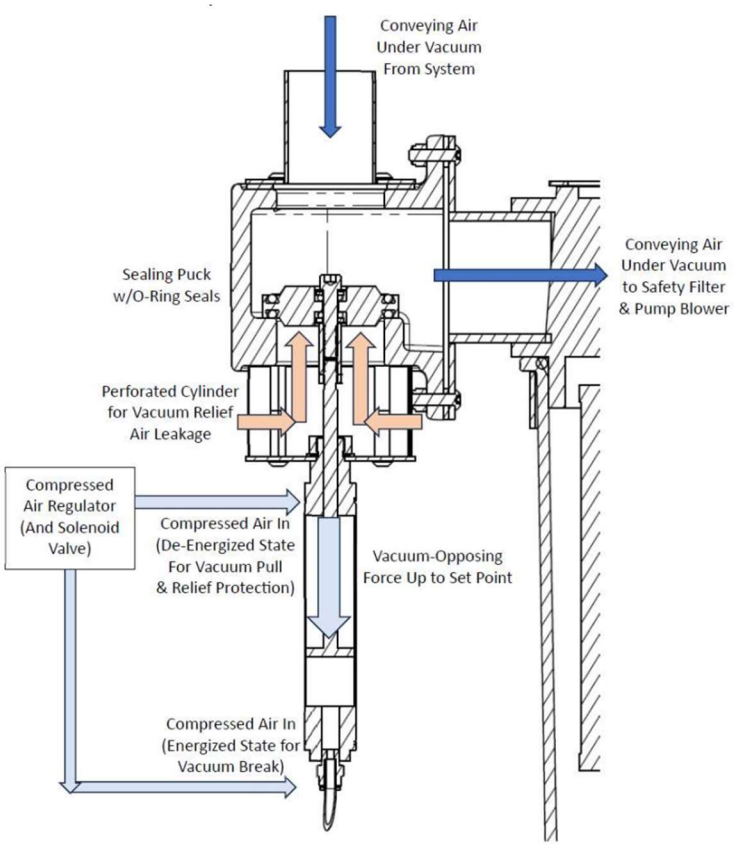



*Figure 3: General Combination Vacuum Breaker & Relief Valve*

### *7.3) Compressed Air Regulator Warning*

The compressed air regulator supplied within the pump control box has been set at the factory to allow the vacuum breaker valve to relieve at a specified vacuum. Tampering or altering the setpoint of the regulator will void the warranty. Only qualified Novatec service personnel may adjust the relief point via regulator pressure.

### *7.4) Ambient Air Vacuum Conveying:*

Pneumatic conveying pellet material requires an air source, one that can pick up the individual pellets at the "Pickup" (or source) and suspend them through the routing lines to the "Receiver" (or destination). This involves regulating the air volume that can be introduced to the stationary material. In most systems, the air used is from the environment around the facility, pulled into the conveying line through a probe or lance with built in carburetor (managing air or material input depending on application), directly controlling the mixture in the system. With the carburetor wide open, the material flow will be light or very dilute. With the carburetor closed shut, the material flow will be heavy or slug. The carburetor is expected to be set to an in-between position that allows the vacuum pump to run 1-2inHg below the vacuum relief point, optimizing the throughput & velocity of the material. General diagram below.

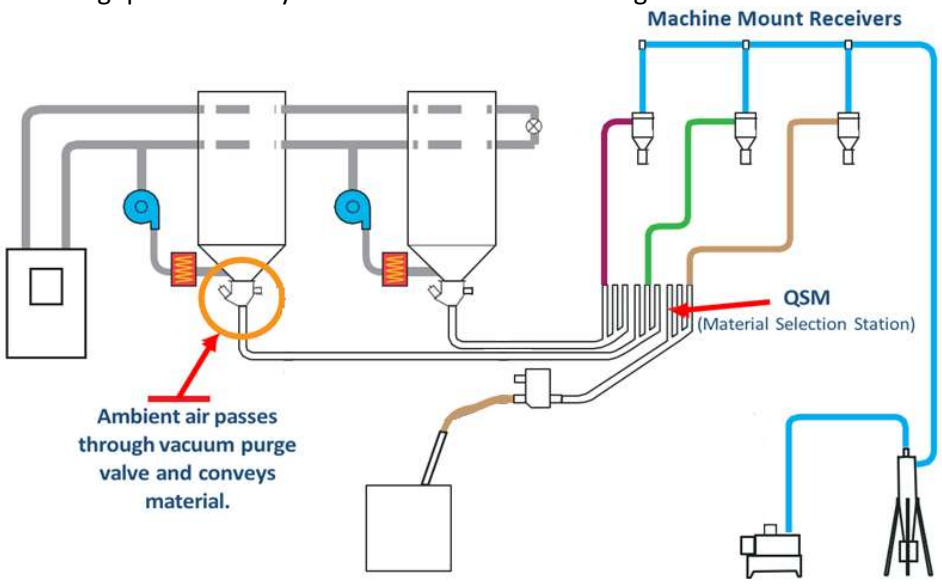



*Figure 4: General Ambient Conveying Schematic*

To maximize throughput, conveying lines that run the same material repeatedly will allow it to rest in the lines in-between load cycles. Line purging is another practice where the conveying lines are cleared in-between load cycles. This can simplify line cleanouts, minimize mixed material stagnation or separation from a blending source, prevent plugs at base of excessively tall vertical runs, and minimized moisture regain in dry-air or closed-loop conveying applications.

### *7.4.1) Vacuum Material Pickup Lance/Wand or Mounted Ambient Carbureted Probe*

Inserted into material source as a transfer device, regulating air/material mixture with ambient air metering.

- Lance/Wand – flex mount to conveying line for free placement, inserted into portable material source, such as: gaylord box, bulk-bag/super-sack, mobile surge bin/container, etc. Air introduction metered via collar or carburetor.


*Figure 5: Accessories - Vacuum Lance/Wand Example*

- Probe – rigid flange mount to collection box (required) below dryer/surge hoppers. Air introduction metered via carburetor for ambient applications; material metered for closed-loop, see section 7.5.

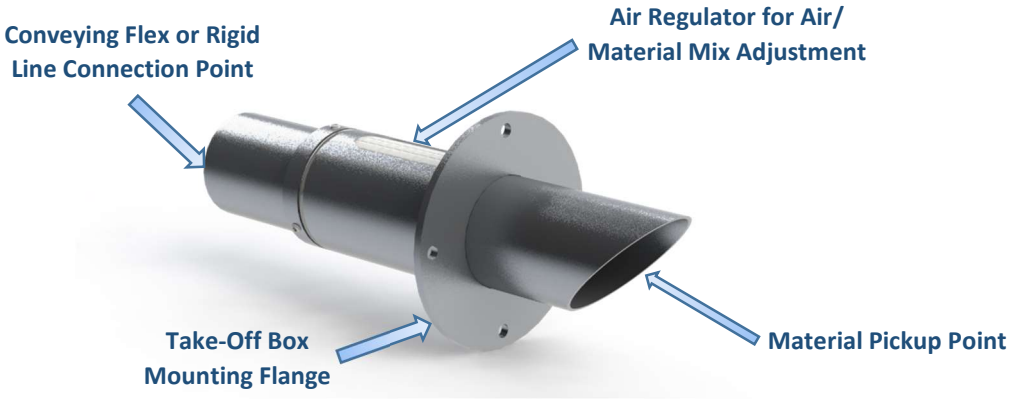



*Figure 6: Accessories - Vacuum Ambient Air Probe Example*

### *7.4.2) Vacuum Purge Take-Off (VPT) or Vacuum Purge Valve (VPV):*

Starts & stops material flow on-demand, regulating air/material mixture with material metering.

- Hard mount to dryer cone discharge, or inline after vacuum probe/lance
- Consists of material inlet, outlet, and separate purge air inlet (either ambient or closed-loop supplied)

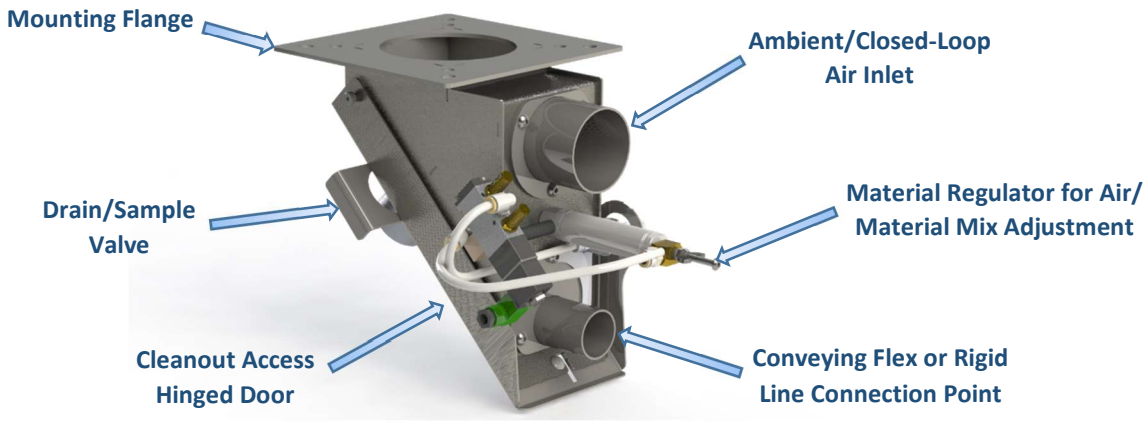



*Figure 7: Accessories - Vacuum Purge Take-Off Valve Example*

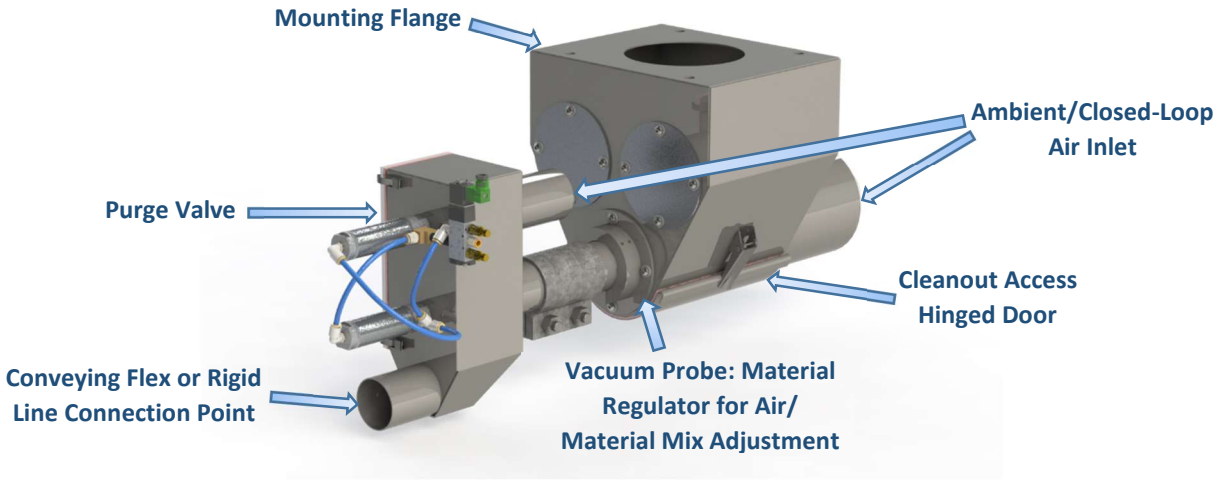



*Figure 8: Accessories - Inline Purge Valve with Multi-Port Take-Off*

### *7.5) Closed-Loop Dry Air Vacuum Conveying:*

Although ambient air conveying systems are effective for many different materials, it may not be the ideal practice for some specific materials. Materials being conveyed that are hydroscopic, or sensitive to rapid moisture regain following the drying process, can have complications in production if additional measures are not taken to mitigate exposure to moisture between the dryer & the process machine. One practice is utilizing a dry air recirculation system that takes the heated low-dewpoint air & dried material conveyed from the drying hopper, pulls it through the vacuum receiver, pulls filtered air back to the pump, and reclaims the pump exhaust air by looping it back to the material pickup point at the dryer. This loop keeps the conveyed air at a low dew point, mitigating moisture regain. General diagram can be found below.

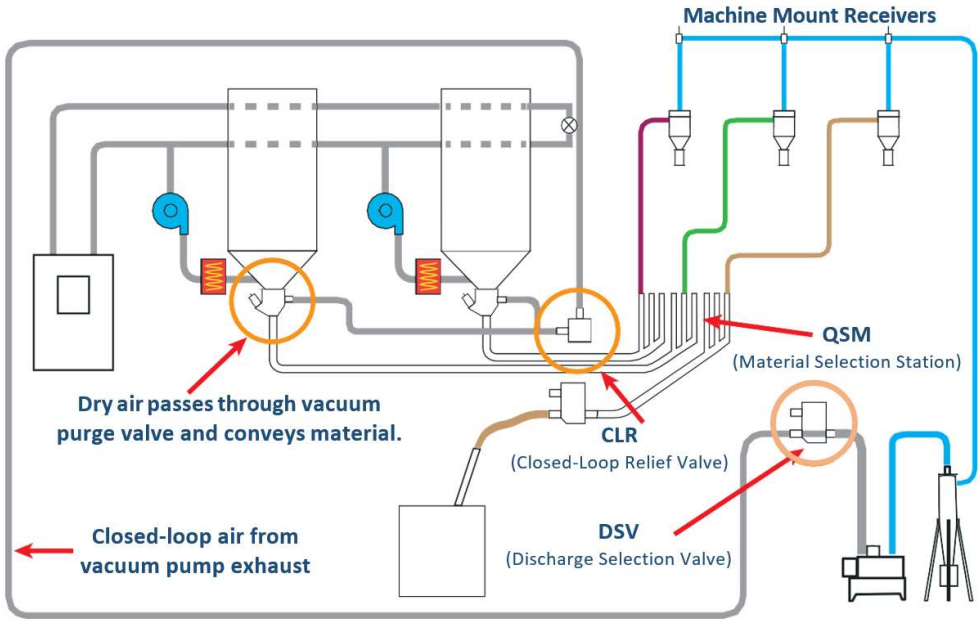



*Figure 9: General Closed-Loop Conveying Schematic*

It is recommended, in this style system, to purge the conveying lines & store the minimum possible shot size of the dried material at the destination to avoid excessive heat loss & accumulation of any available moisture.

Closed-Loop conveying headers include a Discharge Selection Valve (DSV) per vacuum pump, and a Closed-Loop Relief per header.

### *7.5.1) Mounted Closed-Loop Probe*

Inserted into material source as a transfer device, regulating air/material mixture with material metering and closed-loop air source.

- Rigid flange mount to collection box below dryer hoppers. Air introduction via closed-loop recirculation line & drying hopper, material metered via carburetor.
- Requires a separate material collection Vacuum Take-off Box (VTB) with closed-loop recirculation port.

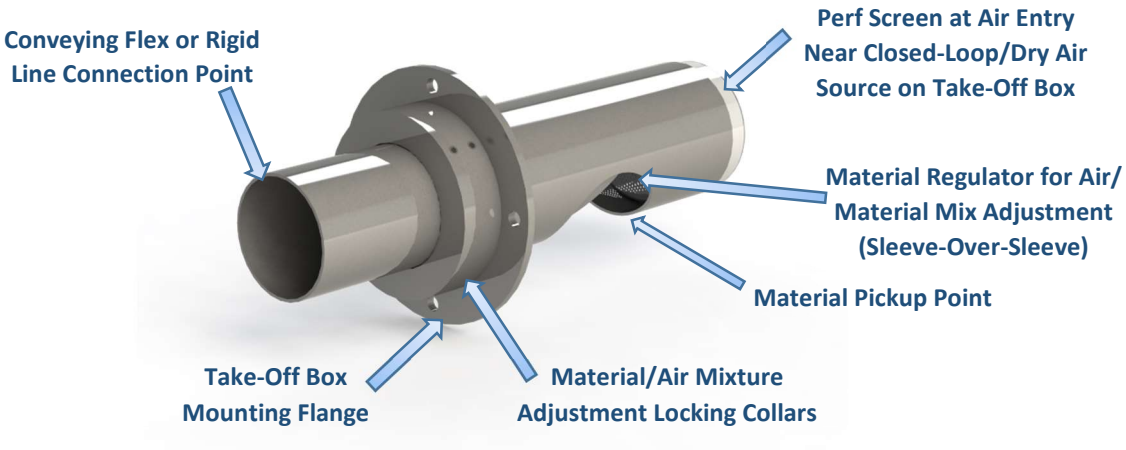



*Figure 10: Accessories - Vacuum Closed-Loop/Dry Air Probe Example*

### *7.5.2) Discharge Selection Valve (DSV):*

Pump exhausts to atmosphere or can be pipe outside of pump room, for use in Closed Loop Conveying Systems.

- Consists of exhaust air inlet, closed-loop recirculation outlet, and ambient air outlet. Valve should vent to ambient in de-energized state for free flow of air in case of valve failure.
- Requires a separate pressure Relief Vent in a closed system to prevent buildup of back pressure in closed-loop line.
- Valve kit includes 3-bolt tube coupler & pump adapter components for Novatec pumps.

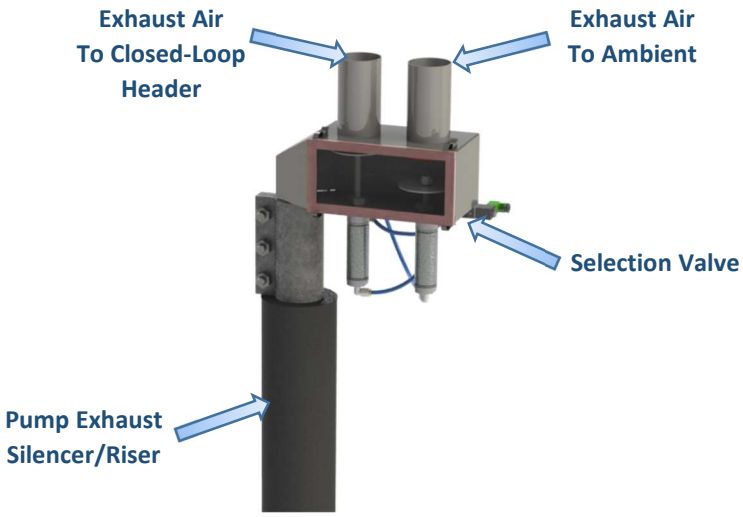



*Figure 11: Accessories - Discharge Selection Valve Example*

### *7.5.3) Closed Lope Relief Vent (CLR):*

Provides pressure relief to pump exhaust air recirculation header, for use in Closed Loop Conveying System.

- Consists of header inlet, header outlet, and pressure vent
- Install one minimum near take-off devices in a closed loop system (orientation dependent).
- Install one per row of take-offs that share a common closed loop manifold.

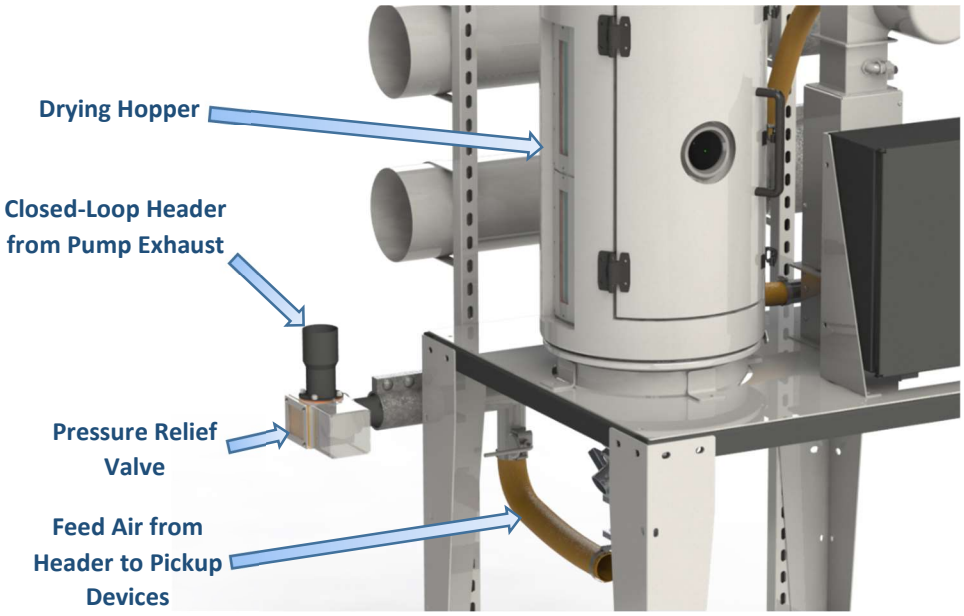



*Figure 12: Accessories - Closed-Loop Relief Valve Install*

## 8.) ELECTRICAL INSTALLATION

Connect the proper power supply (check nameplate) through a main line disconnect switch (not supplied) to terminal connections L1, L2, L3 and ground into the SPD control box that contains the motor starter. This can be field wired using pre-designated concentric knockouts located above the disconnect switch. This is the only power connection required since the motor is pre-wired at the factory. See schematics supplied with this package.

1. Verify nameplate/serial-tag information on the pump frame assembly.
2. Use the FLA/KVA information included in Section 6 (page 5) as a guide.
3. A nominally rated 3-phase disconnect switch must be provided.
4. All connections must be provided in strict adherence to local and national codes by a qualified electrician.

Connect control wiring from the conveying system control panel to the same electrical enclosure as shown on the wiring schematic for the conveying system control panel. This can be field wired as standard using pre-designated PG9/M16 strain relief location knockouts, or pre-wired M12 bulkheads can be installed via factory option. See purchase order for controls wiring approach.

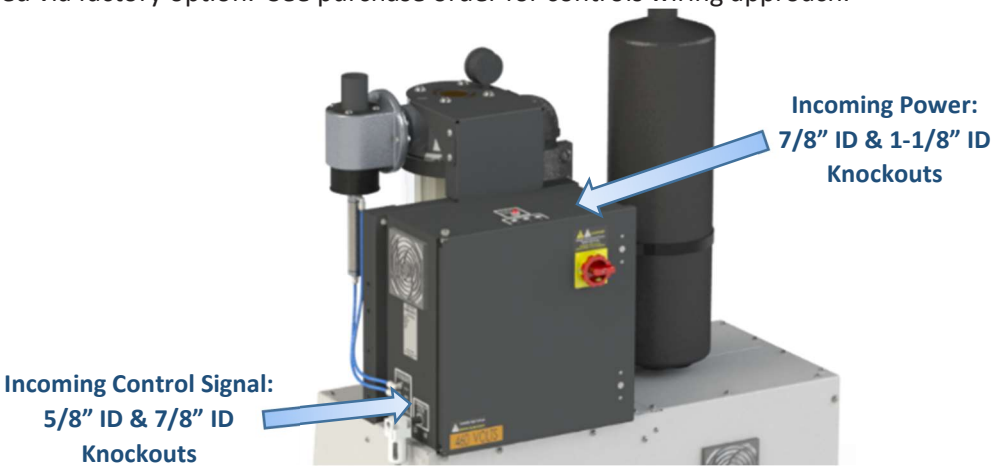
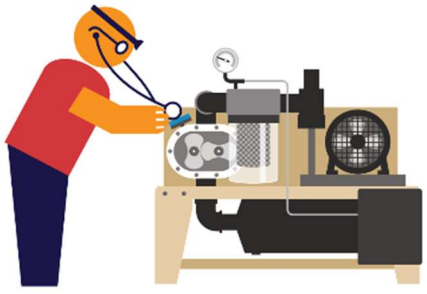



*Figure 13: Install - Power & Control Wiring Knockouts*

Verify all connections are properly terminated & secured. VFD & air regulator analog signal cables to be shielded with drain wire grounded. Validate correct rotation of the motor with the directional labels on the blower assembly inside the enclosure. Reverse direction if necessary through the VFD control interface.

## 9.) PUMPSENSE FEATURES & OPERATION

Novatec PumpSense pump analyzer monitors operating condition and trends health parameters of pumps & blowers in various industrial applications. The sensors easily attach to the pump and consistently measures vibration & vacuum, plus ambient temperature & pressure. The sensors are reliably powered by the incoming pump control voltage and does not rely on batteries for power like competitive units.



Proprietary analytic algorithms track & compare the collected data against a baseline to determine overall pump health: Filter status, oil status, bearing status, pump utilization & vacuum/pressure level trends are all constantly monitored. This enables early detection of symptoms that appear over varying load conditions 24/7, and can help reduce unplanned downtime of equipment. Real-time monitoring replaces time-based maintenance of the pump, and informs the user when maintenance is upcoming or required.


*Figure 14: PumpSense - General Monitoring*

### *9.1) Base Package:*

Localized LED status indicators are available on the vacuum pump control box, to provide the pump status at a quick glance. Three indicators give color designated conditions of oil status, filters status, and overall pump health. See next section for legend.


*Figure 15: PumpSense - Local Status Indicators*

A deeper dive into the pump health can be done by connecting directly to the internal datahub via the available ethernet port on the control box. When paired with a wireless router or dongle, can be accessed via phone or tablet by connecting to the local pump network. Visualization of valuable operating metrics is delivered through easy-to-understand mobile & desktop dashboards.

*Figure 16: PumpSense - Networking & Status Readout*

### *9.2) LED Indicator Legend:*

The LED indicators used on the unit provide a multitude of color statuses to display active conditions of the pump & its components.

| *Equipment Status Indicators* | | *Primary Condition Indicators* | |
|---|---|---|---|
| **Blue** | Startup/Power-Cycled | **Green** | Acceptable Operating Conditions |
| **Purple** | Initializing Data Collection | **Yellow** | Concerning Operating Conditions, Plan for Maintenance or Action |
| **White** | Insufficient Data to Display Status | | |
| **Black/Off** | No Data or Status, Check Sensor | **Red** | Immediate Maintenance or Action Required |

During initial startups & when power is cycled, the "Equipment Status Indicators" will be the prominent colors that will be seen on three onboard LEDs.

- **Blue** → indicates initialization of the PumpSense components from an "off" or power cycled state
- **Purple** → indicates data collection for the available sensors has commenced and has no data to provide a "Primary Condition Indicator".
- **White** → triggered as viable data is being collected, but not enough to provide a "Primary Condition Indicator".
- **Black/Off** → presents an issue with communication with one or more of the available sensors, inconsistent or unviable data is collected, and will require inspection of the connections to or the replacement of the sensors.

During operation of the pump, following adequate data acquisition, the three LED indicators will start propagating one of three "Primary Condition Indicators" in a simple color scheme similar to traffic lights.

- **Green** → indicates all variables within the given monitored function are within acceptable parameters.
- **Yellow** → indicates all variables within the given monitored function are approaching acceptable but concerning levels. Maintenance/action to correct this status should be planned in a given time frame or immediately taken to avoid oncoming performance issues. Please refer to Sections 12 & 13 for standard/common maintenance & troubleshooting practices.
- **Red** → indicates all variable within the given monitored function are in concerning/critical conditions. Immediate maintenance/action needs to be taken to rectify issues of performance loss and machine damage. Please refer to Sections 12 & 13 for standard/ common maintenance & troubleshooting practices.

Oil & Filter indicators are primary maintenance items that have dedicated LEDs for status at a quick glance. The "Check Pump" indicator covers a multitude of other monitored parameters, and will provide the color status of the worst case condition. To access this information, connection via the datahub IP & login will be required to review the other monitored parameters. The IP address for each pump should be determined once connected to the local/pump network. Access to this information is simplified when paired with a Master DataHub.

### *9.3) Complete Package (Master DataHub):*

To unlock the full capability of PumpSense and be able to trend & export collected data, a single Master DataHub (MDH) can be installed into the pump network. This is a localized data collection server that acts as a single access point for all connected equipment data & health metrics, including: PumpSense, Vacuum Pump Analyzer (Retrofit Monitor for Non-Novatec Vacuum Pumps), Component Analyzer (Motorized or Vibratory Equipment Monitor), and Power Analyzer (Electrical Utilities Monitor).

A Master DataHub can also act as a data collection & relay device, working hand-in-hand when paired with Novatec's FlexXpand Gen 3 (FX3) central controller. In lieu of accessing the MDH network directly, connection can be made within the FX3, allowing for local access via the central conveying control HMI & operational network, presenting individual available vacuum pump data & information effortlessly at each pump status page.

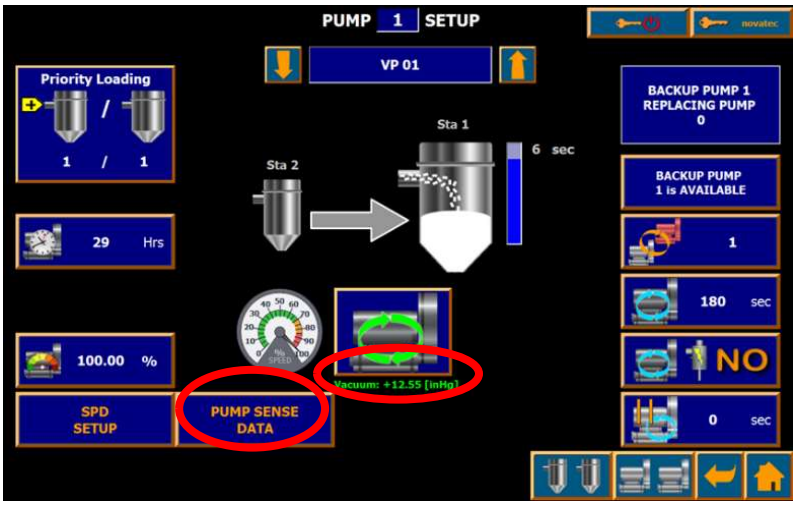



*Figure 17: Controls - FX3 Pump Setup Page*

Use of a MDH is required to unlock the full potential of the SPD's variable speed & vacuum performance, as it relays real-time vacuum & barometric pressure data to monitor, control & adjust each individual vacuum pump's performance levels, based on operational vacuum conditions/analytics, dependent on installation site elevation above sea level.

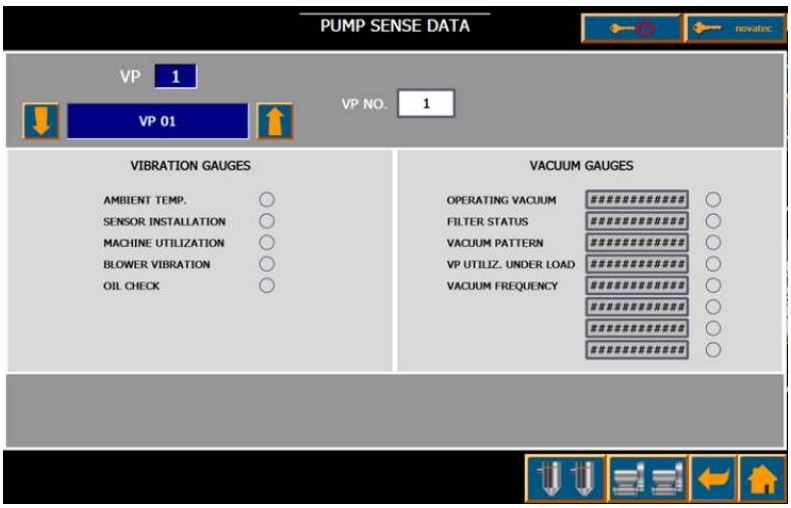



*Figure 18: Controls - FX3 PumpSense Data Access Page*

# 10.) PARTS LIST

## 10.1) 460V, Standard & 400V, Alternate

**SPD SERIES VACUUM PUMPS, STANDARD, 460V**
**(SUBJECT TO CHANGE WITHOUT NOTICE)**

| Description | QTY | Model/Part Number | | | |
|---|---|---|---|---|---|
| | | SPDS-3/15-46-24 | SPDS-5/20-46-24 | SPDS-7.5/22-46-24 | SPDM-7.5/20-46-24 |
| **Blower Assembly** (Drop-In) | 1 | asSPD-BU-5-PD-Q | asSPD-BU-5-PD-Q | asSPD-BU-10-PD-Q | asSPD-BU-10-MF |
| **Blower Lubricant** | 1 | VPDB-QT | | | |
| **Motor Starter Complete Box, 24VDC** | 1 | CNTL-SPD-3-46-24 | CNTL-SPD-5-46-24 | CNTL-SPD-7.5-46-24 | |
| **Variable Frequency Drive, Vacuum Pump, 400V/460V** | 1 | evfd3-abb380 | evfd5-abb380 | evfd7.5-abb380 | |
| **Circuit Breaker** | 1 | ecb-15A-3PD | 13705 | 13706 | |
| **Thermal Snap Switch** | 1 | ehts-212 | ehts-XXX | ehts-XXX | |
| **Vacuum Breaker Valve Assembly** | 1 | asSPD-BV-05 | | | |
| **Vacuum Breaker Valve Solenoid, 24VDC** | 1 | 4V110-06-DC24V-W | | | |
| **Air Regulator, 24VDC** | 1 | 15353 | | | |
| **Vacuum Filter Element** | 1 | hf-047 | | | |
| **Vac Gauge, 0-30” Hg** | 1 | 50011 | | | |

**NOTE:** Parts shown are for standard SPD units. Refer to special job drawings for custom unit information. For information on alternative voltages & options used, refer to: order, drawings, and/or the additional controls kit. Verify information on existing part before ordering and installing replacement. All information is subject to change without notice. For parts assistance, please contact the Novatec Sales Department.

## 10.2) 575V, Alternate

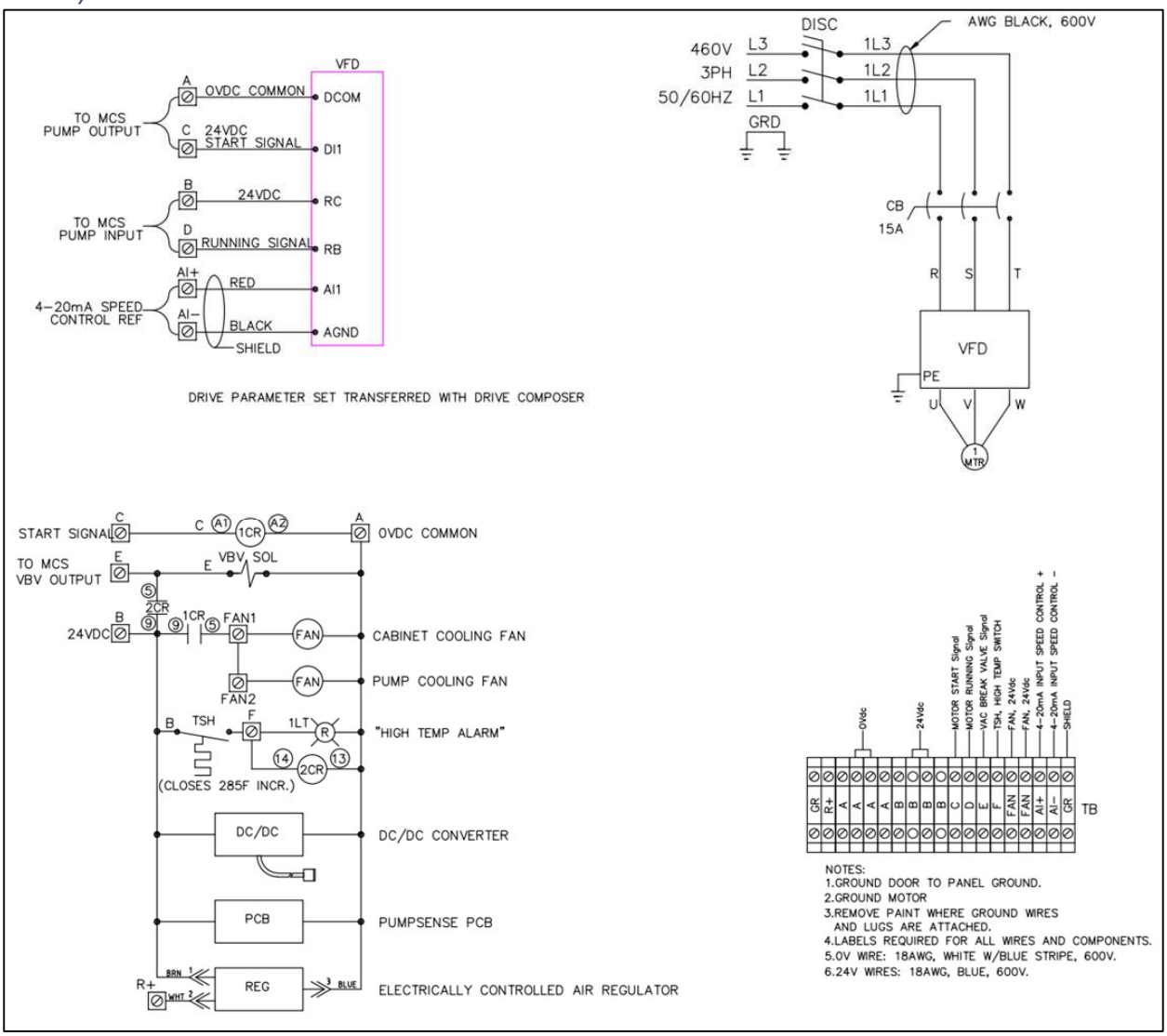
**SPD SERIES VACUUM PUMP, STANDARD, 575V**
**(SUBJECT TO CHANGE WITHOUT NOTICE)**

| Description | QTY | Model/Part Number | | | |
|---|---|---|---|---|---|
| | | SPDS-3/15-57-24 | SPDS-5/20-57-24 | SPDS-7.5/22-57-24 | SPDM-7.5/20-57-24 |
| **Variable Frequency Drive, Vacuum Pump, 575V** | 1 | CNTL-SPD-3-57-24 | CNTL-SPD-5-57-24 | CNTL-SPD-7.5-57-24 | |
| **Fuse Block** | 1 | 95-0592 | | 06-0166 | |
| **Fuses** | 1 | TBD | TBD | TBD | TBD |

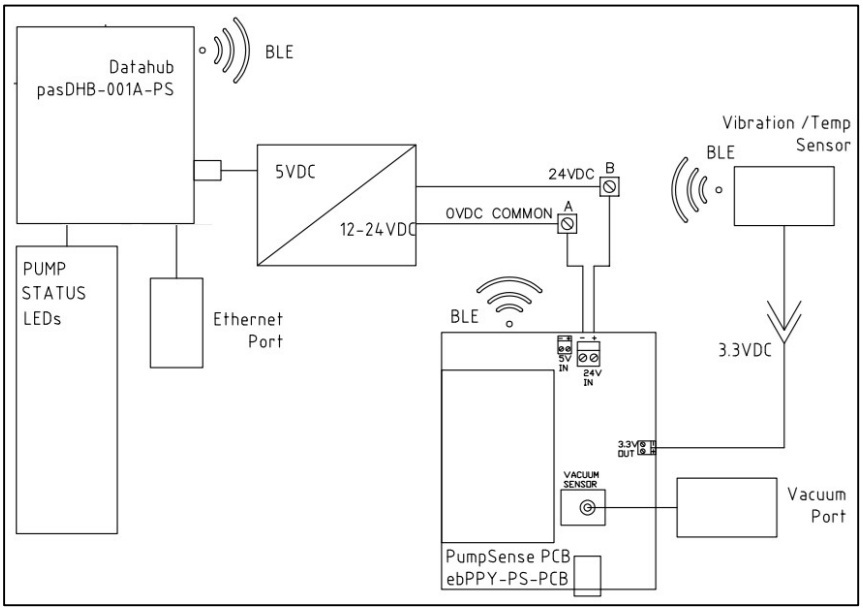
**NOTE:** Parts shown are for standard SPD units. Refer to special job drawings for custom unit information. For information on alternative voltages & options used, refer to: order, drawings, and/or the additional controls kit. Verify information on existing part before ordering and installing replacement. All information is subject to change without notice. For parts assistance, please contact the Novatec Sales Department.

# 11.) Schematics

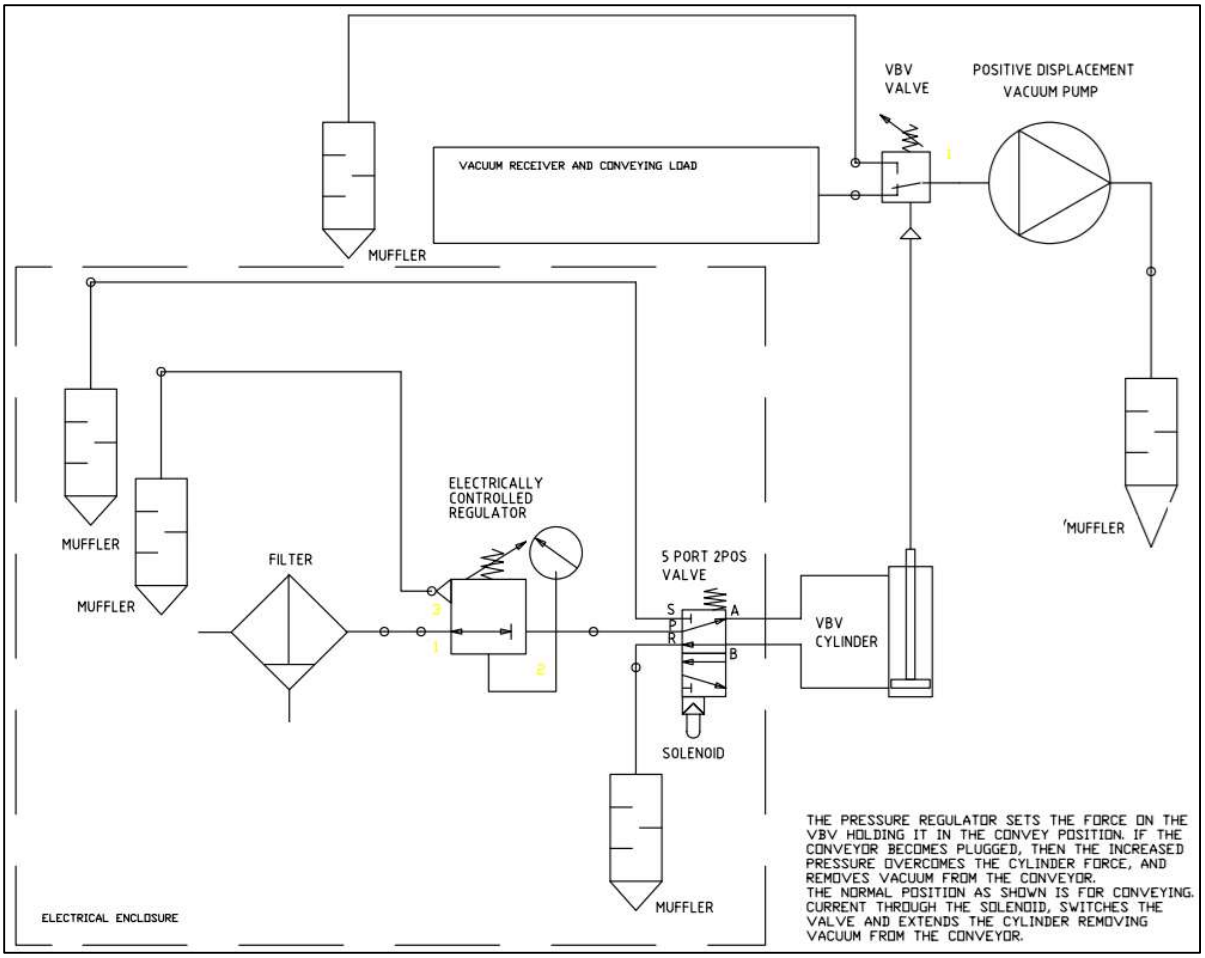
## 11.1) General Electric Schematic




## 11.2) PumpSense Schematic



### *11.3) Compressed Air Schematic*




## *12.) MAINTENANCE & INSPECTION SCHEDULE*

It is recommended that maintenance and inspection is done on a scheduled basis. Maintenance requirements will naturally vary widely for each installation, specific operating conditions, and whether MachineSense® real-time monitoring equipment is installed on the unit.

It is suggested that a complete inspection be performed with the necessary maintenance at the end of the first day, the first week, the first month and the first three months. The results of these inspections will determine how often future maintenance will be necessary.

If MachineSense® real-time monitoring is included, the equipment will analyze the unit performance and provide alerts as to when maintenance should occur.

**BEFORE ANY MAINTANENCE IS STARTED, remember to remove the unit from service and disconnect electrical power! Local disconnect provided on control box of unit!**

### *12.1) General Maintenance*

**EVERY WEEK**

1. Inspect the Filter cartridge. Clean or replace as required. Remove any fines collected from the catch pan. This time interval should be shortened if experience indicates unusual dust loading. (If installed with MachineSense® PumpSense™, filter cleaning or change intervals based on monitored free vacuum condition). Release clamps to remove cannister lid. Pull filter straight out to clean or replace. Wipe out dust or fines accumulated in cannister.

*Figure 19: Maintenance - ClearVu Filter Cannister*

2. Check the system for air leaks and correct as required.

3. Inspect cooling air circulation fan filters. Clean or replace as required.

**EVERY MONTH**

1. Inspect the vacuum breaker valve filter/silencer. Clean as required.

*Figure 20: Maintenance - Vacuum Breaker/Idle Valve*

**EVERY 3 MONTHS**

1. Units equipped with permanently lubricated motor bearings do not need lubrication. All motors should be examined on an individual basis.

2. Check motor(s) amperage (See QC Sheet & Utilities Table) to verify motor health.

3. Check motor-to blower drive shaft coupling rubber insulator condition for signs of wear.

## IMAGE HERE

**EVERY 6 MONTHS**

1. Check for loose electrical connections.

2. Tighten all bolts and nuts.

### *12.2) Blower Maintenance and Lubrication*

Novatec SPD series vacuum pumps include splash lubricated bearings that require no grease, but both the gear & shaft sides of the pump unit contain oil sumps that must be maintained as part of your lubrication & oil replacement procedures. Proper blower lubrication is critical for blower performance and longevity.

To access the blower for oil maintenance, the front blower-side cover must be removed, and can be done so using a 5/16" Allen key to remove (7) ¼"-20 button head cap screws; the oil fill ports, sight glasses, and oil drains are then accessible. **COVER MUST BE REINSTALLED BEFORE PUMP IS PLACED BACK INTO OPERATION!**

The oil change guidelines are as follows:

1. NOVATEC, INC. model SPD series blowers include splash lubricated bearing that require no grease. The blower unit contains two oil sumps that must be maintained as part of your lubrication and oil replacement, and can be accessible with sound shield cover removed. Each sump includes a top-side oil fill port and a drain valve with flow tubes to help simplify this maintenance procedure.

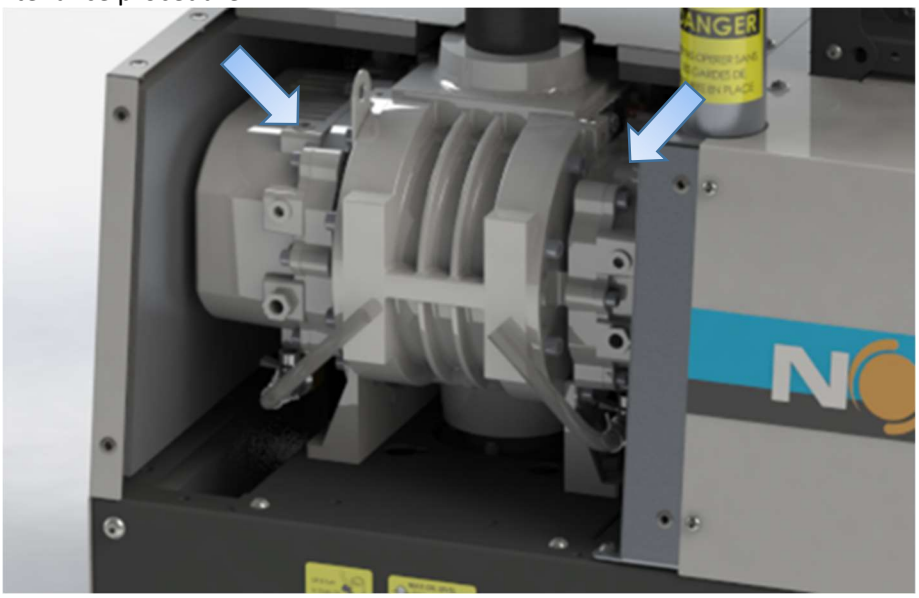


*Figure 21: Maintenance - Vacuum Blower & Fill Port Locations*

2. Replacement of the blower lubrication should be done:
   2.1. After the initial 100 hours of operation.
   2.2. Every 2500 hours thereafter (If installed with MachineSense® PumpSense™, oil change intervals based on monitored blower condition).
   2.3. With fresh Gardner Denver ISO Grade 220 synthetic oil or equivalent.

3. The proper oil level should be in the middle of each sight glass gauge when the blower is not operating, as see in the figure below. DO NOT OVERFILL OIL SUMPS; damage to the blower may occur and voiding of warranty will result. Drain valves can help properly set oil levels, if needed.

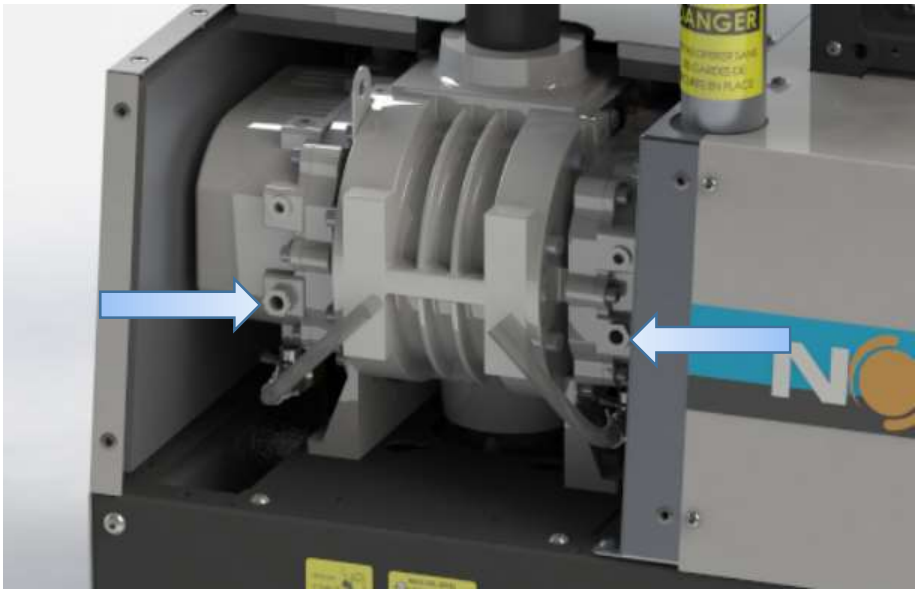


*Figure 22: Maintenance - Vacuum Blower & Oil Sight Glass Locations*

Routine "topping off" of oil levels is NOT advised. Each pump examination should include stopping the pump, allowing the oil level to stabilize, and then checking the level in the sight glass windows before adding oil to the required level. See blower oil capacities and filling locations.

4. The oil level may naturally rise and/or fall in the gauge during operation, but the oil level should not fall below or above the middle of the sight glass when the blower is not in use.

### *12.3) Blower Lubrication Type & Capacities*

Novatec SPD blowers should run using the recommended Gardner Denver AEON PD-XD lubricating oil (or an equivalent ISO-220 Full Synthetic Gear Oil). NOVATEC part numbers for AEON PD-XD oil are:

| 1 Quart | 1 Case (12 Quarts) |
|---|---|
| VPDB-QT | VPDB-CASE |


*Figure 23: Maintenance - Recommended Oil*

Oil capacities of the blower should be for reference when refilling the blower units with the appropriate amount of lubricant. As you approach the expected oil volume specified, focus your attention to the oil level in the sight glass gauge for the remainder of the filling process. Be careful as the oil will need time to settle for true volume measurement. DO NOT OVERFILL OIL SUMPS; damage to the blower may occur and voiding of warranty will result.

| Pump Model | Drive End Sump (oz) | Gear End Sump (oz) |
|---|---|---|
| SPDS-3/15 | 9 | 18 |
| SPDS-5/20 | 9 | 18 |
| SPDS-7.5/22 | 11 | 24 |
| SPDM-7.5/20 | 20 | 32 |

# 13.) TROUBLESHOOTING

## 13.1) No Power or Won't Start

### 13.1.1) Verify Incoming Power

First, disconnect power at the main junction supplying power to the pump, verify all voltage leads are properly terminated at all components, including: disconnect switch, circuit breaker or fuse block, VFD, and motor terminals. This check procedure may require the control box door of the pump to remain open. Once power issue is resolve, the pump disconnect should be turned off to allow the control box door to be closed, then turned back on to put the pump back into normal operation.

Follow the incoming voltage line to check each junction where power can be disconnected:

- Is the main power junction box in the "on" position?
  - If no, enable power following safety practices & verify if the VFD powers up.
  - If yes & no power to the VFD, move down the line to the pump disconnect switch.
- Is the disconnect switch in the "on" position?
  - If no, turn the disconnect handle into the "on" position & verify if the VFD powers up.
  - If yes & no power to the VFD, follow the voltage leads to the circuit breaker.
- Is the circuit breaker in the "on" position.
  - If no, flip the breaker into the "on" position & verify if the VFD powers up.
  - If yes & no power to the VFD, toggle it off and back to on to reset the breaker.
- Is the VFD powered on?
  - If no, verify voltage to the equipment using a voltmeter, and trace back to the source.
  - If yes, check the signal voltage connections. Verify wires are properly terminated and the voltage of the "start" signal wire at the VFD & the main conveying controller. Confirm the VFD is in "REM" (remote) mode and not in "LOC" (local) mode.

### 13.1.2) Verify Control Settings & Signals

Even when power is feeding the vacuum pump (VFD being powered on), the pump won't start unless it is given the signal to do so from the main conveying controller. This signal can come either from the supplied terminals in the main control box or from an expansion box that is linked via communication cabling back to the main controller.

Start at the main conveying controller:

- In the pump screen or individual pump setup screen, is the pump enabled?
  - If no, tap the screen to enable the pump.
  - If yes, confirm the pump is not overtaken by a backup unit, then move onto the station screen.
- In the station screen, are the stations on this pump enable?
  - If no, tap on the screen to enable the station(s).
  - If yes, verify the station status:
    - Is the station(s) in standby (no demand)? Go to the respective station & verify demand switch position. See section 13.2.4 for additional steps.
    - Is the station(s) in an alarmed state? Check status of the station, address issue if present following section 13.2, and clear alarm.
    - If the station(s) is in a demand state, but not being loaded, move onto the individual station setup page.
- In the individual station setup page, verify the proper pump is selected for this station.
  - If the improper pump is selected, change the pump to the correct unit.
  - If the proper pump is selected, confirm the unit is not overtaken by a backup unit, then move onto tracing the wired signal.

In some cases, interruptions in operational signals can occur at different sections of the circuit/system. Follow the incoming control signal wiring from the main controller to the pump terminal blocks:

- For general pump operation, check voltage per respective signals (24VDC):
  - Is there general power at the pump box input terminals: A (0VDC) & B (24VDC)?
    - If no, go to main controller or controller expansion box and verify 24VDC & 0VDC at terminals.
      - If no, check to see if power is to the control or expansion box, and if it is turned on.
      - If yes, trace wiring between control & pump to find an interruption in the signal.
    - If yes, move onto the start signal wire.
  - Is there voltage being sent for the start to the pump: C (Start Signal)? And for the "running" feedback: D (Running Signal)?
    - If no, go to main controller and verify demand for pump operation is present.
      - If no, trigger demand by turning on or forcing demand on stations.
      - If yes, check for 24VDC output from control terminals & trace wiring.
    - If yes, check the signal voltage connections between the terminal blocks & the motor starter/VFD. Verify wires are properly terminated and the voltage of the "start" signal wire & the "running" signal wire. Confirm the VFD is in "REM" (remote) mode and not in "LOC" (local) mode.
- *For Air Speed Control & SPD Speed Control units*, check analog signals (4-20mA)
  - Is there a signal being received at the pump box input terminals: AI+ & AI-?
    - If no, check controller setting for the pump and verify ASC/SPD operation is enabled. Then trace wiring from control terminals to pump terminals, if needed.
    - If yes, check the signal amperage connections between the terminal blocks & the motor starter/VFD. Verify wires are properly terminated and the amperage of the AI+ & AI- signal loop. Confirm the VFD is in "REM" (remote) mode and not in "LOC" (local) mode.

### *13.2) Poor Vacuum or Unable to Convey*

#### *13.2.1) Material Source*

Easily overlooked, the source of your material may be either empty, wrong tubing connections, or valve connections have been made.

Common bulk box issues include:

- 'Rat-holing': The feed tube has sucked up all the free-flowing material around the pick-up end and the material must now be stirred to allow material to flow into the feed tube again. A gaylord tilter may be helpful in this situation.
- Bag liner line plugging: The feed tube has sucked in the thin film lining of the gaylord, blocking off material flow to the receiver.
- Feed tube fell out of the box: By weight of its own hose, or by vibrations of the flex hose while conveying.
- Out-of-material: Time to move in a new bulk box.

Common material selection issues:

- Conveying line connected to the wrong source of material.
- Wrong purge valve selected: If a purge valve is used at the material source, it must be programmed by the system control to operate in conjunction with a specific receiver. Material changes require making a new valve selection at the system control.
- Purge valve is not operating: If a purge valve is used at the material source, it must be energized to allow material loading (and de-energized for purging). A fault at this valve, i.e.

lost compressed air connection, an open purge valve access door, or a material jammed purge valve will prevent material movement.

### *13.2.2) Material Pickup Device: Feed Tube/Wand/Lance or Take-off Box with Probe*

The conveying of material by air cannot be accomplished without air movement. Regardless of the type of pickup device being used; purge valve, wand, take-off box, etc…these devices must be adjusted to allow the introduction of material and air, in a mixture suitable for conveying the specific material the distance required.

### *13.2.3) Receiver Vacuum Station "T" Valve (SV) Operation*

Every vacuum receiver in the conveying system is coupled to a remote vacuum Station "T" Valve (SV) or an integrated External Fill Valve (EFV) that isolates the vacuum conveying power of the pump to one receiver at a time for conveying. Each valve in the system must close off air flow when it is NOT in operation, allowing other receivers to receive full vacuum. One 'stuck' valve can ruin the vacuum supply for the entire system. Check that each valve operates in response to its receiver's turn in the vacuum system. Each valve should open for loading and close when loading is complete. For the SV, the extended shaft of the unit's cylinder is a good indication of that. For the EFV, the plunger position can be seen by looking at the valve through the finger guard on the underside of the receiver lid.

*Rule of Thumb: If only one receiver in the system is conveying correctly, it is probably that receiver's vacuum station valve that is not closing properly.*

### *13.2.4) Receiver Discharge Flapper Operation*

The discharge flapper valve at the base of the receiver provides three critical functions:

- Seal off the base of the receiver, creating a sealed vacuum chamber and allowing it to load,
- Open reliably to allow material to empty out, and
- Signal the conveying control system of the need for more material (when it swings shut, by its own weight).

If the flapper valve is stuck open or does not fully close, conveying cannot take place. A problem receiver can be easily check for proper, free movement of its flapper valve:

- If conveying is not triggered when the flapper is closed, there is an issue with the electrical demand switch,
- If the flapper does not swing nearly shut by its own weight, there is a pivot point (hinge) or counterweight issue,
- If the flapper is 'stuck' in the open position, there is a material contamination issue with the pivot point (hinge) of the valve and it must be cleaned and examined for wear. Contamination of the hinge is typically caused by material finding its way into the picot point, but in older receivers, may also be a metal burr that has formed from age.

### *13.2.5) Receiver Inlet Check Valve Operation*

Many receivers are equipped with swinging check valves on their material inlets. Check valves provide a variety of useful functions for system and unit operation. The check valve is pushed open when material is conveyed into the receiver. On systems that convey material from one source to multiple receivers, each check valve in the system must seal to allow the one receiver being loaded to utilize the full vacuum force from the conveying pump. A check valve that is stuck open, either by hinge wear or a trapped pellet, will leak valuable vacuum air, decreasing vacuum capability at other receivers or even preventing conveying throughout the system.

*Rule of Thumb: On systems that convey material from one source to multiple receivers via a common material line; if only one receiver in the system conveys correctly, it is probably that receiver's check valve that is not closing properly.*

### *13.2.6) Conveying Pump Vacuum Breaker Valve*

Located on the central vacuum pump of the system, the vacuum breaker valve allows ambient air to be drawn into the pump when the conveying system is NOT conveying. This function prevents rapid re-starts and stops of the pump during the 'seek' time of the loading control, cool the pump, and prevents the overloads in the pump starter from overheating. The pneumatically operated breaker valve must close and seal when the vacuum system is conveying material, directing all the vacuum force to the job of conveying.

- For general pump operation, check the following:
  - The valve is connected to a reliable source of clean compressed air, which is turned on. Air pressure should be 80-100psig (built-in regulator will be roughly 30psig for standard elevation).
  - The valve must not be leaking vacuum air. Often a sucking sound can be heard, indicating the valve is not sealing properly (or in normal situations indicates operation at vacuum relief).
  - View the level of vacuum created by the pump on its vacuum gauge while attempting to convey material; although the reading on this gauge will vary greatly depending upon the system configuration, it is a valuable tool for assessing system operation and discovering faults. Vacuum levels below -6" Hg indicate a breaker valve fault or other problems in the vacuum system.
  - Check air regulator set value as this directly correlates to the vacuum relief set point. This value should match the QC paperwork within +/-1psig, unless noted otherwise. This value should never match the 80-100psig input air pressure from the plant. The nominal value for below 3000ft ASL is roughly 30psig if manually set.
- *For SPD Speed Control units*, check analog signals (4-20mA) that regulate electronic air regulator, as this automatically sets the air regulator setpoint for the vacuum relief.
  - Use amperage meter to validate signal to air regulator terminal R+ in pump box and at terminal in main/expansion control.

### *13.2.7) Conveying Control Settings*

Central material conveying systems that include a network of pumps, receivers, and material sources, provide high efficiency and multitude of flexibility. Often, new requirements are not completely programmed after material or system configuration changes. Items to check:

- Is the new material source further away than the previous source? More conveying time and/or purge time might be required to accommodate this difference in distance.
- Is the new material as free flowing as the last material? Does the material tend to clog the conveying lines, or simply convey slower due to weight or shape? Changes to load/purge times as well as material pick-up tube changes may be required.
- Has the receiver been assigned to the proper vacuum pump? The proper material valve?
- Has system piping and/or wiring been modified to accommodate this new configuration for conveying?

## *13.3) High-Temperature Safety Trip*

Due to the variability of the blower/motor rpm & vacuum operation, all SPD pump come equipped with a temperature safety switch on the exhaust side of the vacuum pump that, when the max temperature is met, will trigger the vacuum breaker/idle valve to open and force the pump to pull in ambient air to cool the blower back down. This can happen repetitively if the unit is worked harder than designed.

- If the vacuum gauge shows vacuum levels above the designed relief point dictated in this manual or on the top-level mechanical drawing, there is an issue with the vacuum relief set point controlled by the electronic air regulator.
  - If not interfaced with the SPD Air Speed Control or is used with another control system, then the air regulator either is experiencing a failure leading to increased compressed air to the relief valve, or it has been manually adjusted above the factory set point.
    - If air regulator is experiencing a failure, replace with new unit & adjust to factory relief point. Check with Novatec Service if under warranty or Novatec Parts Department if outside of warranty.
    - If manually adjusted, put back to factory settings. Manual adjustments from factory settings voids warranties that may be in place.
  - If interfaced with the Novatec FX3 SPS Air Speed Control conveying control platform, existing parameters of the system may be putting the pump into a “boost” performance mode frequently, where the regulator compressed air pressure increases in increments to overcome line slugs/plugs. Check the available stations for “Boost” & “SPD Lock” icons to address conveying issues found in those sections of the conveying system.
- If the cooling fan filters are saturated, fan performance will decrease, causing inadequate air circulation within the sound abatement enclosure and increase temperatures that can affect blower casting temperatures. Clean filters regularly per recommended maintenance schedule in the Maintenance section of the manual.

## 14.) WARRANTY – NOVATEC, INC. - Effective Date 23 September 2024

NOVATEC, INC. offers COMPREHENSIVE PRODUCT WARRANTIES on all of our plastics auxiliary equipment. We warrant each NOVATEC manufactured product to be free from defects in materials and workman- ship, under normal use and service for the periods listed under "Warran- ty Periods". The obligation of Novatec, under this warranty, is limited to repairing or furnishing, without charge, a similar part to replace any part which fails under normal use due to a material or workmanship defect, within its respective warranty period. It is the purchaser's responsibility to provide Novatec with immediate written notice of any such suspect- ed defect. Warranted replacement parts are billed and shipped freight pre-paid. The purchaser must return the suspect defective part, freight prepaid and with identifying documentation to receive full credit for the part returned. Novatec shall not be held liable for damages or delay caused by defects. No allowance will be made for repairs or alterations without the written consent or approval of Novatec.

The provisions in equipment specifications are descriptive, unless expressly stated as warranties. The liability of Novatec to the purchaser, except as to title, arising out of the supplying of the said equipment, or its use, whether based upon warranty, contract or negligence, shall not in any case exceed the cost of correcting defects in the equipment as herein provided. All such liability shall terminate upon the expiration of said warranty periods. Novatec shall not in any event be held liable for any special, indirect or consequential damages. Commodities not manufactured by Novatec are warranted and guaranteed to Novatec by the original manufacturer and then only to the extent that Novatec is able to enforce such warranty or guaranty. Novatec, Inc. has not authorized anyone to make any warranty or representation other than the warranty contained here. Non-payment of invoice beyond 90 days will invalidate the warranty. A renewed warranty can be purchased directly from Novatec

Please note that we always strive to satisfy our customers in whatever manner is deemed most expedient to overcome any issues in connection with our equipment.

**Warranty Periods:**

Note: All warranty periods commence with the shipment of the equipment to the customer.

### 5-Year *(Except 1-Year on Non-Novatec Buy-Out Items)*

***Resin Drying to Include***
NovaWheel™ Dryers *
Dual Bed Dryers NovaDrier *
NDM-5 Membrane Dryer
Gas-Fired Process Heaters
Gas-Fired Regeneration Heaters
Drying Hoppers
Central Drying Hopper Assemblies
Heater/Blower Units and Hot-Air Dryers
Silo Dehumidifiers
NovaVac Dryers *
Nitrodry Nitrogen Dryers
DryTemp Plus

***Central System Controls to Include:***
FlexTouch™ Series Controls
FlexXpand™ Series Controls
OptiFlex™ Series Controls
PLC Communications Modules
Greenboard Communications Modules
LOGO! Mini PLC
MCS-600 Series Controls (Distributed I/O)
MCS-400 Series Controls
CL Silo Manager

***Moisture Measurement Equipment to Include***
MoistureMaster®

***PET Resin Crystallizers***

***Resin Blending & Feeding to Include***
WSB Blenders, MaxiBatch & Feeders *
Gaylord Sweeper Systems

***Downstream Extrusion Equipment to Include***
C and NC Bessemer Series Cutters
NPS Bessemer Series Pullers
NPC Mini Puller/Cutter
All NS Series Servo Saws
Rx SmartMed Extrusion Products
All Cooling and Vacuum Tanks Manufactured by Novatec

***Resin Conveying & Systems Components to Include:***
GSL Series Vacuum Loaders
GlassVu Loaders, Receivers and Hoppers
VL/VLP Series Loaders
VR, VRH/VRX, & VRP Series Receivers
Compressed Air Loaders
AL-B Barrel Loader
Cyclone Dust Collectors
Filter Dust Collectors
Surge Bins
Electronic Metal Separators
Quick Select Manifolds
Tilt Tables
Drawer Magnets
Velocity Control Valves
Conveying System Accessories
Valves & Accessories

### 3-Year

***Resin Conveying System Pumps to Include:***
**VPD/VPDB – Vacuum Positive Displacement Pumps
**SVP – Silencer Vacuum Positive Displacement Pumps
**MVP – MaxFlo Vacuum Positive Displacement Pumps
**SPD – Vacuum Positive Displacement Pumps (NEW)
**RCU & RCC - Railcar Unloading Systems

** **5-Year Extended Warranty** - When a MachineSense data plan is activated for pumps with PumpSense™ or RailSence™, Novatec automatically extends the warranty to 5 years. The data plan must be activated within 60 days after pump shipment, and remain active through the warranty period to maintain extended warranty eligibility. The first 6-months of data plan usage is free from Novatec.

### 1-Year

***Resin Conveying System Components to Include***
UltraVac Vacuum Pumps
Vacuum Regenerative Blower Pumps

***Infrared Dryers***
***Custom Equipment of any kind unless otherwise specified.***

**Exclusions:**

Routine maintenance/replacement parts are excluded from the warranty. These include, but are not limited to: hoses, desiccant, filters, filter elements, wiper seals, gaskets, dew point sensors, infrared lamps, motors, internal solenoids, fuses and motor brushes. Use with abrasive materials will void the warranty of any standard product. Wear resistant options may be available to extend usable service life with abrasive materials. Novatec reserves the right to limit the warranty if the customer installs replacement parts that do not meet the specifications of the original parts supplied by Novatec.

***Specific Exclusions:**

1. NovaDrier™ and NITROdry™ warranty is void if coalescing filters are not replaced on a 6-month or yearly basis (per instruction manual) and/or membrane has been exposed to ozone.
2. NovaVac Dryer -The ability of the canisters to hold vacuum will be compromised if the vacuum seal edge is damaged from mishandling. We do not warranty canisters damaged from improper handling. We do, however, warranty the seals.
3. LOAD CELLS on our WSB's are covered by Novatec standard warranty as long as they have not been damaged from improper handling.
4. Desiccant Wheel Warranty will be void if the wheel has been exposed to plasticizer, dust or other contaminants as a result of negligence on the part of the processor.
5. DryTemp+ - We assume no responsibility from equipment failures resulting from untreated or improperly treated water.

**This warranty shall not apply to equipment:**

1. Repaired or altered without written approval of NOVATEC unless such repair or alteration was, in our judgment, not responsible for the failure.
2. Which has been subject to misuse, negligence, accident or incorrect wiring by others.
3. Warranty is void if processing rates exceed manufacturer recommended levels or if damage is caused by ineffective power isolation and/or power spikes/sags or incorrect installation.

NOTE: All conditions and content of this warranty are subject to changes without notice.

**Drying > Conveying > Blending > Downstream**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